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of the shadow of the third satellite, from an elongated streak to a circular spot. (*Chambers' Astronomy*, 4th ed., Vol. I, page 190.)

In making this reply to Professor HOLDEN's criticism of my work, I have taken up in sequence all the points raised that seemed most important to me, and treated them as briefly as possible. I hope that no further discussion of the matter will be necessary. Professor HOLDEN, as he truly remarked, spoke courteously, but very plainly. I am glad that he did so, as it has given me an opportunity to endeavor to do the same. As I am sure he meant no personal offense in making his somewhat severe criticisms of the Harvard observations, so I in turn trust he will take none at my rejoinder.

ADDENDUM.—THE AREQUIPA OBSERVATIONS OF
MARS AND JUPITER IN 1892.

BY EDWARD S. HOLDEN.

I agree with Professor PICKERING that no further discussion of the Arequipa observations is now desirable, and the following paragraphs are only designed to make certain points quite clear before leaving them. I acknowledge the courteous tone of Professor PICKERING's reply, and desire, as he does, to treat the matters in question entirely from a scientific standpoint.

Professor PICKERING entirely misses the important point of my paper. I criticised the large assertions of his cable-telegrams of 1892* (which were addressed to the newspaper readers of the whole world), because he announced various things, which were doubtful then and which he admits are not certain now, with a positiveness which was misleading and unwarranted.

He even went so far as to prophesy that certain melted snow would, by and by, flow in a particular direction. How could he possibly know which way was down-hill?

* I quote part of a single one of these, as follows, and call attention to its very definite statements:

"*Mars* has two mountain ranges near the south pole. Melted snow has collected between them before flowing northward. In the equatorial mountain range snow fell on the two summits on August 5 and melted on August 7. These clouds (on *Mars*) are not white."

Professor PICKERING says these telegrams were partly intended for the general public. If so, I maintain that it was indispensable to explicitly state that they were simply his provisional interpretations of "appearances," not the accepted dicta of science. When Professor PICKERING wrote his articles for scientific publications the positiveness of his cable-telegrams vanished. He did not there insist upon any explanations of his observations, but only on the accuracy (*i. e.*, the faithfulness) of the observations themselves;† he says, guardedly, that certain dark regions are "presumably water."‡ The expression of the telegrams: "*Mars* has two mountain ranges," becomes "the appearance is such as might be produced," etc.; the "region between them," becomes the "supposed valleys," etc.||

In one word, my contention is and was that this eminently justified caution should have expressed itself in the original telegrams. For the lack of it they misled all persons who were not capable of forming an independent opinion; *i. e.*, they misled everyone but the astronomers who comprehended the difficulty of reaching definite conclusions.

I have not criticised the Arequipa drawings because they are inartistic, but simply because they do not prove his assertions. Our own drawings are not artistic, and are not intended to be so. Whatever we announced in 1892, our published drawings prove. Professor PICKERING points out that I was mistaken in supposing that the shadows of *Jupiter's* satellites were not observed in their true shapes at Arequipa. I regret that I made this error, and I withdraw my remarks on this point. So far as I know, there are no published observations of the shapes of these shadows, except those of the LICK Observatory and the single one made in 1861 by Mr. BARNEYBY.

With regard to the bright prominences observed at Arequipa on the limb of *Mars*, Professor PICKERING is in error in saying that "similar" observations had previously been made at the LICK Observatory. We observed no prominences at the full limb of the planet, but very many at the terminator, in 1890 and 1892. The observations at Arequipa and Mount Hamilton are by no means "similar."§

† *Astronomy and Astro-Physics*, 1892, page 675.

‡ *Op. cit.*, page 849.

|| *Op. cit.*, page 851.

§ See *Publications A. S. P.*, Vol. VI (1894), page 166.